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ROBERTS, MLOTKOWSKI & HOBBS P. O. BOX 10064 MCLEAN, VA 22102-8064			HARPER, V PAUL	
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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/896,836	<b>Applicant(s)</b> LEYSIEFFER ET AL.	
	<b>Examiner</b> V. Paul Harper	<b>Art Unit</b> 2626	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7,9-20 and 68-76 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-20 and 68-76 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4, 6, 7, 9, 10, 13, 14, 17, 19, 20, 71-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels et al. (US Patent 6,047,074), hereinafter referred to as Zoels, in view of von Ilberg (U.S. Patent 6,231,604), hereinafter referred to as von Ilberg in view of Leonhard (U.S. Patent 5,884,260), hereinafter referred to as Leonhard, and Boss et al. (U.S. Patent 5,933,805), hereinafter referred to as Boss.

Regarding **claim 1**, Zoels discloses a programmable hearing aid, which includes the following features:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1 items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal (Fig. 1, item 7, col. 2, lines 1-6),

Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 9-11), but Zoels does not specifically disclose "an actuator arrangement configured to provide output stimulation and configured for positioning in a single external auditory passage; said actuator comprising at least dual output stimulators, wherein said output stimulators are at least one intracochlear electromechanical or purely electric stimulator, and at least an additional extracochlear electroacoustic, electromechanical, or purely electric stimulator." However, the examiner contends that this concept was well known in the art, as taught by von Ilberg

In the same field of endeavor, von Ilberg discloses a method for combined acoustic mechanical and electrical auditory stimulation that includes 1 or 2 electrodes for intra-cochlear placement (Fig. 1, item 17, col. 5, lines 33-37, col. 1, lines 57-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing the transducer configuration, as taught by von Ilberg, because it is well known in the art at the time of invention as having advantages for patients who are moderately hearing impaired (col. 3, lines 25-40) and further, of extending the range of use of Zoels' invention to include individuals with borderline deafness.

In addition, Zoels' invention includes a programmable processor, but Zoels does not specifically disclose, "said signal processing unit including, a speech analysis and recognition module, a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment." However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does specifically teach "said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information, and ... wherein said speech synthesis module is arranged to take into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, since it is well known in the art for the

purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 2**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the signal processing unit has a digital signal processor having software modules for speech analysis and synthesis." However, the examiner contends that these concepts were well known in the art, as taught by Leonhard.

Leonhard's system further performs signal analysis and synthesis within a signal processor (Figs. 8, 19, abstract, col. 1, lines 5-20, col. 15, lines 49-54), the processor necessarily containing software modules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing algorithmic features, as taught by Leonhard, for the purpose adhering to standard modular software design practices.

Regarding **claim 3**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible adaptability by replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence

replaceable), which corresponds to “the speech analysis and speech recognition module and the speech synthesis module are adaptive.”

Regarding **claim 4**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable or re-programmable), which corresponds to “the speech analysis and speech recognition module and the speech synthesis module are re-programmable.

Regarding **claim 6**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach “the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit phonetic categories between said modules.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, signal corresponding to phonemes are used (col. 11, lines 1-9, col. 13, lines 14-26, col. 15, lines 17-24, Figs. 8 and 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

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using signal representing phonemes, as taught by Leonhard, since phonetic representation can be used during both recognition and synthesis.

Regarding **claim 7**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach “the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit lexical categories between said modules.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, a word/sentence determination can be made (col. 13, lines 14-26, Fig. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the use of lexical categories, as taught by Leonhard, since lexical categories can improve accuracy during recognition and can also be useful during synthesis.

Regarding **claim 9**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach “said arrangement is configured to detect and extract prosody of speech information is adapted for extraction of level and characteristic of fundamental speech frequency for voiced sounds, and the arrangement configured to take into account prosody of speech information in speech synthesis is adapted to effect the



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corresponding modulation of the output signal.” However, the examiner contends that this concept was well known in the art, as taught by Boss.

Boss further teaches that during the extraction of the prosodic features, pitch (fundamental frequency), duration and amplitude (level) are detected and that these parameters are encoded and used during synthesis (Fig. 4 items 56, 58, and 60; col. 3, lines 5-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, to more accurately reproduce the prosodic features of the analyzed speech.

Regarding **claim 10**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches that the signal processing (used in Zoels specifically for tinnitus treatment, and in Zoels in view of Leonhard for analysis and synthesis) can be enabled and disabled (col. 5, lines 19-44), which corresponds to “the speech analysis and recognition module and the speech synthesis module are adapted to be turned off to enable processing of audio signals without speech analysis and synthesis.”

Regarding **claim 13**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). Furthermore, Zoels teaches that the hearing aid system can be used for tinnitus therapy (i.e., programmed for the

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masking of the tinnitus) (col. 1, line 64 through col. 2, line 55), which corresponds to “the signal processing unit further includes modules adapted to enable masking of tinnitus parallel to operation of the hearing aid.”

Regarding **claim 14**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an amplifier and a signal converter (necessarily including an A/D converter) before the signal processor (Fig. 1 items 6, 4), which corresponds to “the signal processing unit includes, a preprocessing arrangement for at least one of pre-amplification and filtering, and an A/D converter for analog-digital (A/D) conversion of the acoustic signals.”

Regarding **claim 17**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1); in addition, Zoels teaches the use of a signal converter (necessarily including a D/A converter) feeding an output transducer (Fig. 1, col. 2, lines 1-10), which corresponds to “at least one digital-analog converter is connected upstream of the actuator arrangement.”

Regarding **claims 19 and 20**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 17); furthermore, Zoels teaches the use of a digital hearing aid (with a signal converter and a signal processor) that can be employed for tinnitus masking (abstract, col. 2, lines 1-35), which corresponds to “the signal processing unit further comprises a digital signal processor configured to process

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A/D-converted acoustic sensor signals, wherein said signals have been preprocessed by means of said preprocessing arrangement and configured to generate digital signals for tinnitus masking.”

Regarding **claim 71**, Zoels discloses a programmable hearing aid, which includes the following features:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1 items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal I (Fig. 1, item 7, col. 2, lines 1-6),

Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 9-11), but Zoels does not specifically disclose “an actuator arrangement configured for positioning in a single external auditory passage; said actuator arrangement comprising at least dual output stimulators, wherein said output stimulators are at least one intracochlear electromechanical or purely electric stimulator, and at least an additional extracocular electroacoustic, electromechanical, or purely electric stimulator.” However, the examiner contends that this concept was well known in the art, as taught by von Ilberg.

In the same field of endeavor, von Ilberg discloses a method for combined acoustic mechanical and electrical auditory stimulation that includes 1 or 2 electrodes for intra-cochlear placement (Fig. 1, item 17, col. 5, lines 33-37, col. 1, lines 57-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing the transducer configuration, as taught by von Ilberg, because it is well known in the art at the time of invention as having advantages for patients who are moderately hearing impaired (col. 3, lines 25-40) and further of extending the range of Zoels' invention to include individuals with borderline deafness.

In addition, Zoels' invention includes a programmable processor, but Zoels does not specifically disclose, "said signal processing unit including, a speech analysis and recognition module, configured to facilitate the transmission of speech information in a noisy environment." However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does specifically teach "a speech synthesis module arranged to take into account the prosody of speech information in speech synthesis."

However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, since it is well known in the art for the purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 72**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, von Ilberg teaches "wherein said additional stimulator comprises an intracochlear output stimulator (col. 4, line 67 through col. 5, line 3).

Regarding **claim 73**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 72). In addition, von Ilberg teaches "said additional intracochlear output stimulator comprises an electromechanical converter for excitation of the fluid-filled innerear spaces" (col. 1, lines 57-67; col. 2, lines 46-49; col. 5, lines 44-48 with necessary excitation of fluid-filled innerear spaces).

Regarding **claim 74**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 72). In addition, von Ilberg teaches “said additional intracochlear output stimulator comprises a purely electrical electrode array” (col. 2, lines 44-48, multichannel array electrodes may be ...).

Regarding **claim 75**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, von Ilberg teaches “said at least dual output stimulators comprise: an extracochlear multichannel array of electromechanical converters for stimulation of the middle ear, and an intracochlear electrically acting stimulation electrode array, having at least one stimulation electrode for electrical stimulation of the inner ear” (col. 2, lines 7-22; lines 37-51, multichannel array may be partially or fully inserted ...; col. 5, lines 25-37).

Regarding **claim 76**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, Zoels teaches “said extracochlear output stimulator comprises an electroacoustic stimulator” (col. 1, lines 9-11; and von Ilberg teaches [col. 5, lines 25-30] an acoustic meachanical component similar to that found in prior art hearing aids).

2. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 1 above, and further in view

of Markowitz (*Using Speech Recognition*, Prentice Hall, 1996), hereinafter referred to as Markowitz.

Regarding **claim 5**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach “the speech analysis and speech recognition module and the speech synthesis module include a digitally implemented neural network.” However, the examiner contends that this concept was well known in the art, as taught by Markowitz.

In the same field of endeavor, Markowitz teaches the techniques for using and implementing speech recognition. In addition, Markowitz teaches the use of neural networks for speech recognition (p. 44, §2.5.1 “Neural Networks for Speech Recognition,” p. 46, §2.5.7 “Neural Networks for Speech Coding”).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the neural network techniques for speech recognition, as taught by Markowitz, for the superior classification techniques resulting from the use of neural networks.

3. Claims 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 10 above, and further in view of well known prior art (MPEP 2144.03).

Regarding **claim 11**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches an automatic change in the control elements (in this case, a change in the generated signals for tinnitus therapy) (col. 5, lines 20-44), which corresponds to “configured to automatically turn off the speech analysis and recognition module and the speech synthesis module [signal processing modules] ...”. But Zoels in view of Leonhard does not teach that the switching occurs “at a low level of interfering sound.” However, the examiner takes official notice of the fact that the automatic switching of noise-reducing signal processing software was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that automatic switching could be used, making the operation of the unit more convenient for the user.

Regarding **claim 12**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches that the signal processing can be controlled by a control element (Fig. 4 item 17, col. 5, lines 20-44), which corresponds to “configured to turn off the speech analysis and recognition module and the speech synthesis module ...”. But Zoels in view of Leonhard do not specifically teach that the means is “...by remote control.” However, the examiner takes official notice of the fact that the use of a remote control for the purpose of controlling the operation of a hearing aid was well known in the art.



Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that a remote control could be used, making the operation of the unit more convenient for the user.

Regarding **claim 15**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 14), including the use of a signal converter (Zoels, Fig. 1 item 14), but Zoels in view of Leonhard do not specifically teach "the preprocessing arrangement comprises an anti-aliasing filter." However, the examiner takes official notice of the fact that the use of an anti-aliasing filter before an analog to digital conversion for the purpose of reducing aliasing was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard to include an anti-aliasing filter, to improve the quality of the signal processing.

4. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 1 above, and further in view of Magotra et al. (US Patent 5,608,803), hereinafter referred to as Magotra.

Regarding **claim 16**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use

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of a microphone connected to a signal converter (Fig. 1, items 6, 4), but Zoels in view of Leonhard do not specifically teach, "a plurality of acoustic sensors, wherein said acoustic sensors are configured to be upstream of an analog-digital converter." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where the outputs of two microphones are feed into A/D converters (Fig. 1, items 10, 1, col. 3, Ins 35-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic inputs, as taught by Magotra, for the purpose of improved filtering capabilities.

Regarding **claim 18**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an output transducer connected to a signal converter (Fig. 1, items 5, 4), but Zoels in view of Leonhard do not specifically teach that "the actuator arrangement comprises a plurality of actuators, and wherein a respective digital-analog converter is connected upstream of each actuator." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where stereo outputs feed earphones (Fig. 1, items 8, 11, 13; col. 3, lines 40-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic outputs, as taught by Magotra, so that stereo output can be supported.

5. Claims 68-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and Boss.

Regarding **claim 68**, Zoels discloses a programmable hearing aid, which includes the following:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1, items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal, said signal processing unit including (Fig. 1, item 7, col. 2, lines 1-6),
- an actuator arrangement configured to provide output stimulation (Fig. 1, item 5).

In addition, Zoels' invention includes a programmable processor (Fig. 1), but Zoels does not specifically teach "a speech analysis and recognition module, wherein said speech analysis and recognition module are configured to perform at least one of speech information segmentation or recognition, ..." However, the examiner contends that these features were well known in the art as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does not specifically teach "...said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information, and a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment, wherein said speech synthesis module is arranged to take into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

providing the features, as taught by Boss, since it is well known in the art for the purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 69**, Zoels in view of Leonhard and Boss teach everything claimed, as applied above (see claim 68). Furthermore, Boss teaches "said signal processor is configured to output a purely artificial speech signal" (Boss, col. 3, lines 30-37, synthesizer selects digitized patterns in the dictionary ...)

Regarding **claim 70**, Zoels in view of Leonhard and Boss teaches everything claimed, as applied above (see claim 69). Furthermore, Leonhard teaches "said signal processor is configured to effectively eliminate inputside interference portions" (col. 15, lines 30-33, improve noise suppression in speech signals).

### ***Response to Arguments***

6. Applicants' arguments filed 6/15/2006 have been fully considered but are not persuasive.

7. Applicants' assert on page 11:

Applicants respectfully submit that the Examiner has failed to meet the above burden in the § 103 rejection of claim 1. Zoels is directed to a combination of a device "for tinnitus therapy with a digital hearing aid [that] has the further advantage that this device can also be used for persons with normal hearing. (See, Zoels, col. 4, fns. 31-33.) In Zoels, "the hearing aid can be employed as a tinnitus masker... or only as hearing aid." (See,

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Zoels, col. 2, Ins. 16-19.) Therefore, Applicants assert that Zoels is directed to a hearing aid device for the hearing improvement of individuals who have *little to moderate hearing loss* and is not directed or intended to be used by individuals who have little to no hearing. (Italics added)

Von Ilberg teaches that his invention produces significant advantages for individuals who have **moderate** hearing loss to border line deafness (col. 3, lines 29-31) where the both von Ilberg and Zoels share the moderate range and therefore the advantages of von Ilberg's teachings. Furthermore, the teachings of von Ilberg have the added advantage of extending the range of use of Zoels' invention to the boarder of deafness.

8. Applicants further assert on page 12:

As a result, in the device of von Illberg, extracochlear electrical stimulation is used such that "the electrical stimulation should be coupled to the cochlea so that intact structures are not destroyed-the option for electrical stimulation alone at a later time via cochlear implantation." (emphasis added) (See, von Illberg, col. 3, fns. 34-38.) *Applicants assert that due to this facts, von Illberg teaches away from the use of intracochlear stimulation, especially intracochlear stimulation in combination with extracochlear stimulation.* In fact, von Illberg suggests that the device of von Illberg would not function with a combination of "at least one intracochlear electromechanical or purely electric stimulator, and at least an additional extracochlear electroacoustic, electromechanical, or purely electric stimulator" as recited in Applicants' claim 1. (Italics added)

The examiner disagrees. Rather, von Ilberg teaches a combination of both acoustic mechanical stimulation and electrical stimulation (col. 3, lines 25-30) including intra-cochlear placement (col 5, lines 25-36).

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9. Applicants further assert on page 12;

In fact, as stated in the MPEP §2141.03, if a "proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed combination." (citing, *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)). In the present case, the modification of Zoels to include the "at least one intracochlear electromechanical or purely electric stimulator" would render Zoels unsatisfactory for "having advantages for patients who are moderately hearing impaired" as asserted by the Examiner. Therefore, for these reasons, Applicants submit that the references taken alone or in combination fail to provide any motivation to make the combination of Zoels and von Ilberg as asserted by the Examiner.

See ¶7, noting that both Zoels and von Ilberg share the moderate hearing loss range, and that the teachings of von Ilberg can be used to extend the useful range of Zoels' invention when used as a hearing aid.

10. Applicants assert on page 13

In response, the Examiner rejected Applicants' arguments and stated that "while Zoels indicates the benefits of noise reduction... Zoels does not go into the specifics of any noise reduction algorithms which are further discussed by Leonhard." (See, Office Action, page 22.) *However, not only does Zoels "indicate the benefits of noise reduction," but, as noted above, the device of Zoels is also capable of actually reducing noise in a signal.* (See, Zoels, col. 4, Ins. 33-38.) (Italics added)

The examiner maintains that there is a difference between indicating that something can be done (Zoels col. 4, lines 35-37; "reduces unwanted noise") and the teachings of Leonhard that include signal analysis, recognition and synthesis as a means to improve noise suppression in hearing aids (Leonhard, Figs 8, 19, abstract,

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col. 1, lines 5-20; col. 15, lines 16-25, 30-34) where the additional teachings correspond to other claim limitations.

11. Applicants assert on page 13:

The Examiner is respectfully reminded that a reference may be sufficient to stand for something, even if it does not state details. (See, MPEP §2123, noting that "a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art;" see also, *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.)). *In accordance with this above cited case law, because Zoels already discloses noise reduction in a signal this alone is sufficient to teach to one of ordinary skill in the art a means of "improving the quality of the speech signal" as asserted by the Examiner.* (See, Office Action, page 4.) Therefore, because Zoels already has means for "improving the quality of the speech signal," the Examiner's provided motivation completely fails to explain why one of ordinary skill in the art would have been motivated combine the teachings of Leonhard with the device of Zoels.

See previous argument. The examiner also notes that any given technique at noise reduction not likely to be 100% effective and thus giving further motivation for improved and additional techniques.

12. Applicants assert on page 15:

First, the Examiner relies upon von Illberg to teach the claim elements recited in Applicants' amended claim 1 of "an actuator arrangement configured to provide output stimulation and configured for positioning in a single external auditory passage; said actuator arrangement comprising at least dual output stimulators, wherein said output stimulators are at least one intracochlear electromechanical or purely electric stimulator, and at least an additional extracochlear electroacoustic, electromechanical, or purely electric stimulator." (See, Office Action, page 3.) However, von Illberg teaches the use of a combination of "acoustic mechanical stimulation and electrical stimulation... [wherein] the electrical stimulation



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should be coupled to the cochlea so that intact structures are not destroyed-the option for electrical stimulation alone at a later time via cochlear implantation should remain." (See, von Illberg, col. 3, Ins. 26-41.) This excerpt from von Illberg indicates that the device of von Illberg is incapable of operating with a combination of "dual output stimulators, wherein said output stimulators are at least one intracochlear electromechanical or purely electric stimulator, and at least an additional extracochlear electroacoustic, electromechanical, or purely electric stimulator" as recited in Applicants' claim 1. Furthermore, the entire von Illberg disclosure fails to teach or suggest such a configuration.

See the current rejection of claim 1.

13. Applicants assert on page 17:

As a result, both Boss and Leonhard, alone or in combination, completely fail to teach or suggest "a speech analysis and recognition module, wherein said speech analysis and recognition module is arranged to detect and extract additional prosody of the speech information" as recited in Applicants' claim 1. For at least this reason, Applicants submit that the rejection of claim 1 under § 103 was improper and should be withdrawn.

Zoels discloses the use of a programmable hearing aid with a signal processor (col. 1, lines 6-11). Leonhard discloses analysis, recognition and synthesis techniques for processing speech in a noisy environment based on phoneme recognition (abstract, Fig. 8, col. 1, lines 5-20, also used with hearing aids). And Boss teaches the recognition of phonemes and prosodic information and the subsequent use of the prosodic information during synthesis (abstract, Fig. 4, col. 3, lines 1-37, prosodic parameters are applied during synthesis). Thus the combination of Zoels in view of Leonhard and Boss teaches the above limitations.

For responses to remaining arguments, see the rejections and arguments above.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is (571) 272-7605. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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7/5/2006

V. Paul Harper  
Patent Examiner  
Art Unit 2626

A handwritten signature in black ink, appearing to read "V. Paul Harper", is written over the printed name and title.